



# A Screening-Level Assessment Tool for Classifying Hydraulic Fracturing Fluids

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# Public concerns regarding hydraulic fracturing

%	Very concerned	Somewhat concerned	Not very concerned
Impacts on the environment	40	44	16
Impacts on water quality	35	40	25
Lack of disclosure	56	32	12

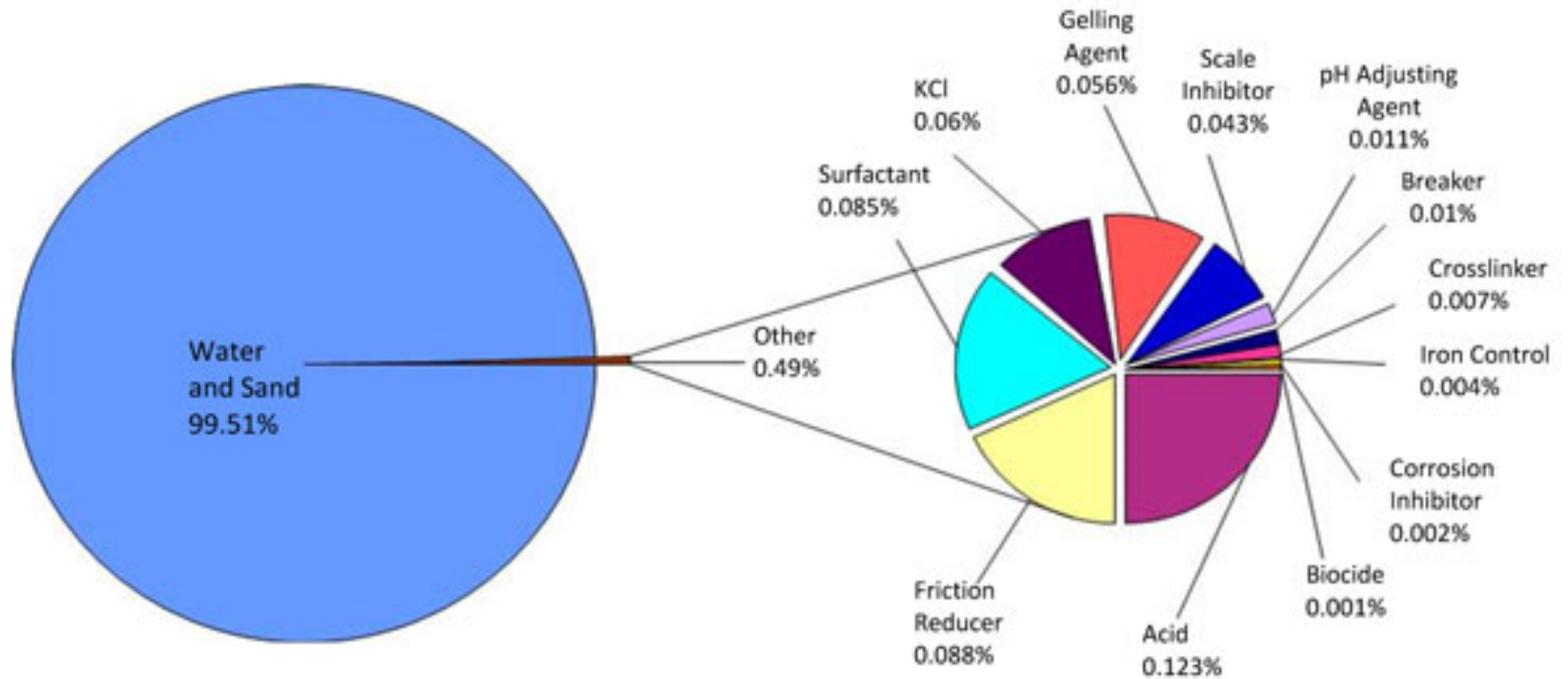
Source: Energy Institute, Univ. of Texas at Austin, Feb., 2012

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# Background ...

- Early 2010, Encana Inc. recognizes mounting public concern over hydraulic fracturing.
- Initiates company-wide “Responsible Products Program” aimed at ensuring that hydraulic fracturing can be performed safely without harm to human health and the environment.
- Intrinsik retained to develop a screening-level assessment tool to allow the company to better understand potential health and environmental impacts associated with use of hydraulic fracturing fluids.
- Late 2011, Intrinsik retained by CAPP to develop Canadian industry-wide version of tool.

# Basic features ...



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# Basic features ...

- A “screening-level” tool.
- Product-based ... ingredient-driven.
- Based on full compositional details of products.
- Differs from FracFocus® (... a complementary tool).
- Tool is meant to increase awareness and understanding of potential product hazards so that appropriate measures can be taken to reduce the likelihood of adverse health and/or environmental impacts.
- Not meant to be used in isolation...tool is only one part of a company’s overall stewardship/responsible products program.
- One option under CAPP’s Hydraulic Fracturing Operating Practices

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# What the tool does...

- Classifies products in terms of their potential health and environmental impacts.
- Considers certain key physical, chemical and toxicological properties of the product ingredients
- Relies on databases developed by reputable authorities as source of ingredient information.
- “Rolls up” ingredient-based information to classify the products into one of three categories.

# The process ...

Identification of product ingredients (CAS #'s)



Review of ingredients against screening criteria



Classification of products



Category A  
No action  
required



Category B  
Controls/practices  
required



Category C  
Further review  
required

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# Screening criteria ...

- Carcinogenicity
- Mutagenicity
- Reproductive/developmental toxicity
- Acute/short-term oral toxicity (mammalian)
- Chronic oral toxicity (mammalian)
- Toxicity to aquatic systems
- Environmental persistence
- Potential to bio-accumulate



# Screening criteria...

Endpoint (Public Health)	Specific Criteria	Authority	Cut-off Conc. (%)
Carcinogenicity	Known or presumed human carcinogen	EU ESIS 1A or 1B IARC 1 or 2A NTP “known to be a human carcinogen”	≥ 0.1
Mutagenicity	Known or presumed human germ cell mutagen	EU ESIS 1A or 1B	≥ 0.1
Reproductive toxicity	Known or presumed human reproductive toxicant	EU ESIS 1A or 1B	≥ 0.1
Acute oral toxicity (mammalian)	Highly acutely toxic Oral LD <sub>50</sub> ≤ 5 mg/kg BW	EU ESIS Cat. 1 ECOTOX OECD SIDS	≥ 1.0
Short-term oral toxicity (mammalian)	Highly toxic ≤ 300 mg/kg BW	EU ESIS STOT SE Cat.1 ATSDR MRLs (acute)	≥ 1.0
Chronic oral toxicity (mammalian)	Highly toxic ≤ 10 mg/kg BW/day	EU ESIS STOT RE Cat. 1 USEPA IRIS ATSDR MRLs (inter./chronic)	≥ 1.0

## Screening criteria ...

Endpoint (Environmental)	Specific Criteria	Authority	Cut-off Conc. (%)
Aquatic toxicity (fish, invertebrates, plants)	$LC_{50} \leq 1 \text{ mg/L}$	EU ESIS Cat. 1 Environment Canada	$\geq 1.0$
Acute oral toxicity (mammalian - wildlife)	Highly acutely toxic Oral $LD_{50} \leq 5 \text{ mg/kg BW}$	ECOTOX EU ESIS Cat. 1 OECD SIDS	$\geq 1.0$
Environmental persistence	Highly persistent under aerobic and/or anaerobic conditions	USEPA EPI Suite BIOWIN®v.4.0	$\geq 1.0$
Bio-accumulation potential	Highly bio-accumulative based on combination of BCF, BAF and Kow	Environment Canada	$\geq 1.0$

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# Product Categories ...

- Category A – No action required
  - The product is not expected to cause adverse health and/or environmental impacts, and can be used without specific controls and/or practices.
  - All ingredients “pass” all screening criteria

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# Product Categories ...

- Category B – Controls/practices required
  - The product is not expected to cause adverse health and/or environmental impacts provided specific controls and/or practices are in place.
  - One or more of the ingredients is:
    - Highly toxic to aquatic systems;
    - Highly persistent in the environment; and/or,
    - Highly bio-accumulative

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# Product Categories ...

- Category C – Further review required
  - The product could potentially cause adverse health and/or environmental impacts, and requires further review.
  - One or more of the ingredients is a:
    - known or presumed human carcinogen;
    - germ cell mutagen;
    - reproductive toxicant; and/or,
    - substance known or suspected to be highly toxic to humans from acute and/or chronic oral exposure.

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## Experience to date ...

- More than 1,500 products classified ... capturing more than 500 ingredients
  - 10% assigned to Category C
  - 40-45% assigned Category B
  - Remainder assigned to Category A
- Tool has proven to be rapid, flexible, and transparent.
- Tool of interest to Canadian regulatory authorities based on early discussions.

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## On-going ...

- Work to develop Canadian industry-wide version of the tool continuing under CAPP sponsorship.
- User Guide and Instruction Manual being written.
- Peer-review of tool in process.
- On-line version of tool and construction of ingredient database under consideration.
- Tool basics being shared with E&P companies, fluid suppliers and regulatory authorities.



Thank you  
(... and now over to Richard)